Entrapment, Entanglement & Drowning

What is the issue?
Many sources contribute to entrapment and drowning impacts to birds, including:

- Oil, tar and brine pits,
- Evaporation ponds,
- Tanks and tubs, heater-treaters, trays, and other open-top containers
- Oil spills
- Fishing nets and gear

An estimated 500,000 to 1 million birds are killed annually in oil pits and evaporation ponds. In one study, 51 % of all birds found at oil and gas facilities were in heater-treaters, 30% in various pits, 4% in wastewater ponds, 4% tanks and trays, and 1% spills. More birds are likely found in heater-treaters compared to other sources as they are contained and are not vulnerable to scavenging by predators. In pits and ponds, many birds likely go undetected because they sink, are scavenged by predators, or picked up by people. Thus, current estimates of bird deaths at these sites probably underestimate the true impact.

Oil & Gas

Why does this happen?
Birds entering pits, ponds, tanks, heater-treaters, trays, and open-top containers at oil and gas fields (https://www.fws.gov/mountain-prairie/contaminants/contaminants1a.html) may not be able to get out due to sticky oil fluids, impaired feathers, or steep sides to the pit and container.

Skim pits (https://www.fws.gov/mountain-prairie/contaminants/contaminants1e.html) and reserve pits (https://www.fws.gov/mountain-prairie/contaminants/contaminants1g.html) are prime examples of types of open pits that can cause frequent and high numbers of migratory bird deaths. Open-top containers, drip buckets (https://www.fws.gov/mountain-prairie/contaminants/LoadLineContainers.html), dehydration tanks, or tubs (https://www.fws.gov/mountain-prairie/contaminants/DehyTubs.html), and well chemical spill containment devices can also attract and entrap migratory birds. Brine ponds commonly used in Commercial and Centralized Oil Field Wastewater Disposal Facilities are problematic for the same reason. When entrapped, birds can:

- Drown – When a bird gets coated in oil or surfactants (https://en.wikipedia.org/wiki/Surfactant), feather insulation is lost and surface tension is reduced resulting in the loss of buoyancy and drowning;
- Starve – Birds entrapped in a pit or container are unable to forage and can starve to death;
- Experience Cold Stress – When oil and surfactants cause birds to lose their feather water-proofing and insulation, they can die from hypothermia;
- Experience Heat Stress – Birds coated in oil can also become susceptible to heat stress. When ambient temperatures are high, the dark oil coating the bird can exacerbate heat absorption and retention; or
- Asphyxiate – Birds that become entrapped inside heater-treaters and vent stacks can succumb to gases being vented.

Birds may intentionally or accidentally ingest toxins in fluids with oil or other chemicals while entrapped in a pit or container. Birds typically suffer from sodium toxicity resulting from the hypersaline fluids, especially in evaporation ponds. Contact with oil or toxins may also:

- Reduce individual health resulting in an increased vulnerability to disease and predation;
- Increase systemic effects such as anemia, immune suppression, and cell damage; and
- Impair reproduction through the transfer of oil to eggs/chicks

To date, 183 species of migratory birds have been documented in oil pits, ponds, and heater-treaters. Of these, songbirds (https://en.wikipedia.org/wiki/Songbird) made up 62%, followed by 10% waterfowl (https://en.wikipedia.org/wiki/Waterfowl), and 8.5% waterbirds (https://en.wikipedia.org/wiki/Water_bird). While songbirds are impacted by heater-treaters more than any other birds, they also make up 49% of all documented kills from pits and tanks. Of the songbirds killed in pits and tanks, 76% were in reserve pits, 12% in skim pits, 6% flare pits, and 6% in tanks, trays, and spills. Waterfowl and waterbirds made up 48% of all kills in pits, ponds, tanks, and trays. Of all waterbird mortality, 69% are in reserve pits, 25% in wastewater disposal ponds, 3% in skim pits, and 3% due to other pits and spills.

The risk of bird mortality at an oil field increases when:

- Pits and ponds are located in areas with few water resources, making them more attractive to birds;
- Surface area of pits and ponds increases, attracting waterfowl and waterbirds;
- Reserve pits remain open for long periods after well completion; and
- Birds are not excluded from pits, ponds, or heater-treaters by fencing, netting, or wire mesh.

What are some solutions?
Oil spills: In the event of an oil spill, there are measures that a team of professional wildlife responders can take to address and reduce the impacts to migratory birds. For more information, see the USFWS Best Practices for Migratory Bird Care during an Oil Spill Response (https://www.fws.gov/contaminants/Documents/best_practices.pdf)
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Oil, tar and brine pits: Solutions to preventing wildlife mortality in oil field waste pits and evaporation ponds are fairly simple and straight forward and are being implementing by many oil operators. These include:

- Using Closed Containment Systems
- Eliminating Pits or Keeping Oil Off Open Pits or Ponds
- Using Effective and Proven Exclusionary Devices (nets/fencing)

- All pits and ponds will be enclosed by fence immediately at the end of construction;
- Net mesh size will ensure that birds are excluded from all pits and ponds:
- Netting will be securely suspended at least 5 feet above the pit/pond surface; and

- Netting will be made from ultraviolet/photo degradation resistant material.

- Disposing of Oil Field Wastewater by Deep Well Injection

For more details about pit and pond impacts to birds and appropriate conservation measures to minimize these impacts, see the USFWS fact sheet on Migratory Bird Mortality in Oilfield Wastewater Disposal Facilities (https://www.fws.gov/mountain-prairie/contaminants/documents/COWDFBirdMortality.pdf)
and the
USFWS Region 6 Environmental Contaminants website (https://www.fws.gov/mountain-prairie/contaminants/contaminants1c.html).

Open pipes, vents and exhaust stacks: Putting screens or caps on these structures, or using wildlife safe versions are easy and inexpensive measures for preventing bird and bat entry and discourage perching, roosting, and nesting. Removing unsafe infrastructure that is no longer in use is also a helpful and effective solution.

For instance, the following measures can be extremely helpful in avoiding bird kills from open vents.

- Covering all vents and openings to the heater-treater with wire mesh;
- Building vent stacks with cone screens that prevent birds from landing, nesting, and sitting on them.

Another example is the capping of open-pipe mining claim markers. Open-pipe mining claim markers were discovered to be resulting in the deaths of many birds that entered them and became trapped. In response, an effort to raise awareness about the impacts of these structures and remove or replace them has resulted in a large-scale reduction of potential mortality from this infrastructure. To read more about the impacts of this specific type of open pipe and learn about what can be done to reduce these impacts see the
BLM website regarding mining claim markers (http://www.blm.gov/wo/st/en/prog/more/non-energy_minerals/request_to_mining.html).

Commercial Fisheries

Why does this happen?
When large fishing nets are used where birds often float or dive, the risk of entanglement and entrapment is a possibility. Bird impacts are also a threat when baited hooks are easily accessible where they hunt for food, putting them at risk for being hooked or ensnared as they pursue the bait.

In response to growing concerns fueled by bird mortality during commercial fishery operations, the fisheries community, concerned environmental groups and federal agencies that oversee these operations have been actively involved in pursuing and implementing solutions.

What are some solutions?
A number of measures can be employed to reduce bird by-catch from commercial fishing operations. Depending on the type of fishing operation and gear being used, multiple measures may need to be used be needed simultaneously. Some basic measures include:

- Using hooks that, when baited, sink as soon as they are put in the water
- Discharging fish waste in a manner that distracts seabirds from baited hooks
- Removing hooks from fish waste that is discharged
- Ensuring birds brought on board a fishing vessel alive are released alive
- Whenever possible, removing hooks from birds brought on board a fishing vessel without jeopardizing the life of the birds
- Using special lines proven to reduce bird impacts
- Deploying fishing gear at night when birds are less active
- Deploying gear from the side of a vessel rather than the stern in conjunction with other measures
- Using blue-dyed, thawed bait and weighted lines

To view best practices and information related to avoiding and minimizing impacts from fisheries refer to the
Seabird Bycatch Solutions for Fisheries Sustainability Manual (http://www.fisheryandseabird.info/resources/manual). To access and use a decision support tool designed to help fisheries workers and managers assess risk of seabird bycatch in geographic areas of interest, and take steps to minimize or eliminate impacts to seabirds from fishing net and gear, see the
Seabird Maps and Information for Fisheries (http://www.fisheryandseabird.info/home) website.

For more specifics about measures that can be taken to avoid impacts to birds by commercial fishing operations, refer to Seabird Conservation Measures Required by NOAA for Commercial Fishing Vessels (https://www.fws.gov/migratorybirds/pdf/management/noaafisheriesseabirdconservationmeasures.pdf) and the NOAA Fisheries Seabird Program website (http://alaskafisheries.noaa.gov/protectedresources/seabirds/national.htm).

For more information about measures and guidance for avoiding and minimizing impacts to migratory birds, please visit the Conservation Measures (https://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php) and Guidance Documents (https://www.fws.gov/birds/management/project-assessment-tools-and-guidance/guidance-documents.php) webpages.

Material on this webpage was sourced from: Albers 2003; Esmoil and Anderson 1995, King and LeFever 1979 Lokemoen 1973; Flickinger and Bunck 1987; Ramirez 2000, 2002, 2005, 2009, 2010, 2013, 2014; Trail 2006; P. Trail pers com; USFWS 2009a; USFWS 2009b

Last Updated: May 25, 2016